

### **Listing of Claims**

This listing of claims will replace all prior versions and listings of claims in the Application.

1-12. (Canceled)

13. (Original) An active optical lattice filter for selectively processing an optical input signal, said lattice filter comprising:

- a plurality of optical gain blocks spaced apart from one another in a linear array;
- a surface grating coupler positioned between each pair of adjacent gain blocks in said array, each of said surface grating couplers disposed to transmit a portion of an optical signal received as an input from one of its adjacent gain blocks to its other adjacent gain block, and to reflect the remainder of said received input; and

- each of the gain blocks is provided with controllable gain and delay characteristics respectively selected to produce an output from said array comprising an IIR when said input signal comprises an optical pulse.

14. (Original) The active lattice filter of Claim 13, wherein:

- said gain blocks are respectively implemented by placing electrodes in spaced apart relationship upon an active region of semiconductor material to form corresponding gain regions therein; and

- each of said surface grating couplers comprises a grating formed in the surface of said active region between adjacent gain regions.

15. (Original) A 2-Dimensional lattice filter disposed to selectively process an input signal, said lattice filter comprising:

a plurality of delay blocks, each delay block disposed to receive, process and project specified signals, said delay blocks grouped into at least one filter section for said lattice filter; and

a plurality of 4 direction couplers, each 4 direction coupler being associated with delay blocks in at least one of said filter sections, each 4 direction coupler positioned to exchange specified signals directed along a first axis with one of its associated delay blocks, and to exchange specified signals directed along a second axis orthogonal to said first axis with another of its associated delay blocks.

16. (Original) The 2-Dimensional lattice filter of Claim 15, wherein:

said input signal comprises an optical signal pulse.

17. (Original) The 2-Dimensional lattice filter of Claim 16, wherein:

each of said 4 direction couplers has two pairs of faces, the faces of each pair being parallel to one of said first and second axes.

18. (Previously Presented) The 2-Dimensional lattice filter of Claim 16, wherein:

at least one of said delay blocks has a controllable gain for selectively amplifying a signal coupled therethrough.

19. (Previously Presented) The 2-Dimensional lattice filters for Claim 18, wherein:

said filter is disposed to operate as an active filter.

20. (Original) The 2-Dimensional lattice filter of Claim 19, wherein:

each of said 2D lattice couplers comprises a crossed grating coupler.

21. (Original) The 2-Dimensional lattice filter of Claim 19, wherein:

each of said direction couplers comprises a crossed beam splitter.

22. (Original) A 2-dimensional filter section comprising:

a plurality of delay blocks positioned around a closed loop in spaced apart relationship; and

a plurality of 4 direction couplers interspersed between said delay blocks to form a closed path for signal flow, each of said 4 direction couplers disposed to exchange specified signals with two adjacent delay blocks along first and second orthogonal axes, respectively.

23. (Original) The 2-Dimensional filter section of Claim 22, wherein:  
said filter section is disposed to receive an input signal comprising an optical signal pulse.
24. (Original) The 2-Dimensional filter section of Claim 23, wherein:  
at least one of said delay blocks has a controllable gain for selectively amplifying a signal coupled therethrough.
25. (Original) The 2-Dimensional filter section of Claim 24, wherein:  
said filter section is disposed to operate as an active filter.
26. (Original) The 2-Dimensional filter section of Claim 25, wherein:  
each of said 4 direction couplers comprises a crossed grating coupler.
27. (Original) The 2-Dimensional filter section of Claim 25, wherein:  
each of said 4 direction couplers comprises a crossed beam splitter.
28. (Original) The 2-Dimensional filter section of Claim 22 wherein:  
said filter section comprises a particular filter section of a higher order 2-Dimensional lattice filter comprising multiple filter sections, each substantially identical to said particular filter section.
29. (Original) A 2-Dimensional filter stage comprising:  
a linear array of 4 direction couplers positioned in spaced apart relationship along a first axis, each of said 4 direction couplers disposed to establish selected transmission paths for signals traveling along said first axis, and to establish other transmission paths for signals traveling along other axes that are respectively orthogonal to said first axis;  
one or more first delay blocks, each positioned between two of said 4 direction couplers to selectively process signals traveling therebetween along said first axis; and  
a plurality of second delay blocks, each positioned along one of said orthogonal axes to selectively process signals directed therealong by a corresponding one of said 4 direction couplers.
30. (Original) The 2-Dimensional filter stage of Claim 29, wherein:  
said filter stage is disposed to receive an input signal comprising an optical signal pulse.

31. (Original) The 2-Dimensional filter stage of Claim 30, wherein:  
at least one of said delay blocks has a controllable gain for selectively amplifying a signal coupled therethrough.
32. (Original) The 2-Dimensional filter stage of Claim 31, wherein:  
said filter stage is disposed to operate as an active filter stage.
33. (Original) The 2-Dimensional filter stage of Claim 32, wherein:  
each of said 4 direction couplers comprises a crossed grating coupler.
34. (Original) The 2-Dimensional filter stage of Claim 32, wherein:  
each of said direction couplers comprises a crossed beam splitter.
35. (Original) The 2-Dimensional filter stage of Claim 29 wherein:  
said filter stage comprises a particular filter stage of a higher order 2-Dimensional lattice filter comprising multiple filter stages, each substantially identical to said particular filter stage.
36. (Previously Presented) A 2-Dimensional filter stage comprising:  
a linear array of multi-direction couplers positioned in spaced apart relationship along a first axis, each of said multi-direction couplers disposed to establish selected transmission paths for signals traveling along said first axis, and to establish other transmission paths for signals traveling along other axes with respect to said first axis;  
one or more first delay blocks, each positioned between two of said multi-direction couplers to selectively process signals traveling therebetween along said first axis; and  
a plurality of second delay blocks, each positioned along one of said other axes to selectively process signals directed therealong by a corresponding one of said multi-direction couplers.